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I, KIM MARSHALL, MANAGER EXAMINATION SUPPORT AND SALES, hereby certify that the annexed is a true copy of the Provisional specification in connection with Application No. PP 2477 for a patent by DICKORY RUDDUCK filed on 18 March 1998.

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ORIGINAL

AUSTRALIA

PATENTS ACT 1990

PROVISIONAL SPECIFICATION FOR THE INVENTION ENTITLED

"FIXING AND RELEASE SYSTEMS"

This invention is described in the following statement:

In one aspect, this invention relates to a system of fixing one element to another using remote means. In another aspect, this invention relates to a system which enables the remote fixing and remote release of elements. In still another aspect, this invention relates to a system which can provide information as to the status of the relationship between elements, for example whether they are fixed or not and whether they have been released or not. In some forms, this invention relates to fixing or release in a sequential manner between elements. Other aspects will also be disclosed in the following description.

The systems of this invention have particular application to the building industry. However, the invention is not limited to this area and has application in many other arts. For the sake of convenience, in many cases the description below will relate to the building industry.

The need to fix one element to another, such as a panel to a stud, has given rise to a large technology relating to fasteners. Primitive versions, such as nails and screws are labour intensive and have the drawback that the fixing means are visible externally.

More sophisticated methods of hidden fixing have been devised. In some aspects, this invention represents an improvement on the hidden fixing of elements.

Accordingly, this invention provides a fixing system for fixing a first element to a second element, in which, after the first element is aligned to the second element in a desired manner, the application of remote fixing means causes the first element to be fixed to the second element. This invention also provides a remote release system for releasing a first element from a second element to which the first element is fixed, in which the application of remote release means causes the first element to be released from the second element.

In the systems of the invention, there may be more than two elements which are fixed or released. For example, one first element may be fixed to or released from a plurality of second elements; a plurality of first elements may be fixed to or released from a single second element; or a plurality of first elements may be fixed to or released from a plurality of second elements. Further, where there is a plurality of elements, these need not be identical. A plurality of first elements may differ from one another; a plurality of second elements may differ from one another.

The remote fixing or release means may be any suitable means and many of these will be apparent to persons skilled in the various relevant arts. Non-limiting examples of remote fixing and release means are set out below.

The remote fixing means may provide the force or message required to activate fixing or release of the elements. Examples are the use of magnetic attraction or repulsion, the use of high frequency heating or radio frequency heating, the transmission of a message via a radio or other waves and so on.

In its simplest forms, the systems of the invention may cause the pushing of two elements together, or the locking of those elements, or the pushing of those two elements apart, or the unlocking of those elements. In this regard, there may be a connecting means which can be regarded as "obedient" to the force or message generated by the remote fixing means.

In more sophisticated versions of the systems of the invention, the message can convey instructions (eg. digitally) which will enable the elements to move towards one another or apart from one another, or a connector between them to open or close. In particular, the message may cause movement in any or all of three dimensions.

In yet more sophisticated versions of the systems of the invention, it may be possible not only to transfer messages, but also to receive reports. For example, it may be possible to receive a report as to whether two elements are in a fixed state or in a released state, or whether the connection between them has been damaged or is stressed, for example because of movement as result of an earthquake or because of tampering, such as an attempt to gain access to an electrical duct.

Further, encryption may be included in the systems of the invention, to incorporate security. This can be useful, for example, where it is desired to restrict access to elements or to objects or material for which the elements provide a barrier. One example is the fixing of airplane parts, where access to part inspection, removal or replacement is to be restricted to authorised persons. The incorporation of encryption into the systems of the invention can require an appropriately coded activation means in order to permit fixing or release of the elements.

These last-mentioned examples of the systems of the invention can be regarded as "intelligent obedient" versions, since not only is there response to a message

or force provided by the remote means, but also feedback can be obtained as to state of the fixing or release and access can be restricted in an appropriate manner.

In one version of the "intelligent obedient" systems of the invention, a report can be obtained as to the location of the fixing or release mechanism.

Another advantage which the "intelligent obedient" systems of the invention can have is to prevent unauthorised release after assembly (of the elements) has been completed.

The ability of the systems of the invention , in one form, to move one element relative to the other, in any of three dimensions, provides an enormous boost to the problems encountered in the building industry, where wall height, for example, can vary by 50 to 60 millimetres; the present invention, in some aspects, makes it possible to effect required adjustments on site. This permits tolerance, for example, vertically, and gives the capacity to deal with orthogonal movement.

It will be appreciated that, in those versions of the systems of the invention which enable release of the elements, the invention provides a ready means for demounting buildings or parts of buildings without the need for demolition and with the ability to preserve building elements for re-use.

Further, especially in the "intelligent obedient" form, it is possible to effect fixing or release of the elements in a set sequence. This can be useful, for example, when fixing a large panel to studs. It may be desired to fix the top and bottom corners first to ensure correct alignment and follow by fixing in other areas. In one version of the systems of the invention, the fixing of the four corners of the panel will activate in sequence the fixing at the subsidiary locations.

As has been stated above, this invention is not limited to application in the building industry. There are numerous other areas in which remote activation of a fixing or release of two elements relative to one another is desired. By way of example only, the following are mentioned. Where it is desired to maintain a sterile environment, such as in the packaging of blood, for example, the valve inside the packaging may be activated remotely in order to release the blood, in accordance with the blood. The activation may be carried out by applying a magnetic force, for example, to a disc in the valve. It will be appreciate that sterility can be maintained in these circumstances.

As another example, remote activation of fixing or release can be useful in the food industry, where the introduction of contamination is to be minimised.

The fixing or release of one element relative to the other may be effected using a connector means separate from the elements or by using connection means which are incorporated in the first or second elements, or both. This latter aspect may be regarded as part of "on board technology", which is discussed further, below.

As non-limiting examples of connector means which are separate from the first and second elements, there may be mentioned the following.

A fastener having two parts, one being a female part which can be attached to one element during or after manufacture and the other being a male part attached to the second element during or after manufacture can be aligned so that the male part is received within the female part, following which locking of the male part to the female part is effected by remote means.

As another example, glue which is cured by RF heating may be inserted at appropriate locations between the first and second element, after which the glue is cured by the application of RF heating and the elements are fixed one to the other. It will be appreciate that in this embodiment it may not be possible to release the elements subsequently.

As a further example, one element may be joined to another element in a spaced manner by elongated joiners, for example, for the purpose of inserting cabling between the elements. The joiners can then be activated by suitable means so that they collapse, allowing the elements to be fixed as closely to each other as the cabling or other material will allow.

As an example of "on board technology", which is discussed in further detail below, one element may have protrusions, while the other element may have recesses or pits adapted to receive the protrusions, so that after remote activation, one element is fixed to the other and optionally can be released from the other after further activation.

Turning now to "on board technology", this invention also provides an element, preferably a building element, which incorporates technology which facilitates subsequent installation of the element and/or which reduces the need for subsequent treatment of the element.

Broadly, "on board technology" principles can be applied to the areas of fitting, fixing and finishing. In relation to the areas of fixing and fitting, an element such as a panel, for example, may be provided with means for fitting the panel to a stud, for example. An instance of this is the insertion of a longitudinal groove down one edge of a panel, into which may be received a clipping member, which in turn can fit the panel to the stud. Likewise, the panel may incorporate a longitudinal tongue which can connect directly to the stud or to a groove in a clipping member which can then connect to the stud.

As an example of the fixing aspect, reference is made to the example given above in relation to the elements having protrusions or recesses which can cooperate with corresponding recesses or protrusions on other elements. These may be arranged on a face of each element, so that the elements can be fixed face to face. These may also be arranged in other locations on the elements, such as along the edges.

The "on board technology" may include grooves, pits, ribs, lumps, recesses or protrusions and these may be continuous or isolated. As further examples, there may be textures or embossing or undercut grooves or recesses on panels, for the purpose of adding a texture to one or more faces of panels, in order to provide traction during fixing, or to provide a decorative finish.

In relation to finishing, "on board technology" may provide elements with a selected finish, such as a decorative finish, textured or not, which can obviate the need for further treatment of the element after building or other assembly has been completed. Thus, for example, there may be no need to paint the element after assembly or building.

It will be readily appreciated by those skilled in the art that "on board technology" enables the manufacturer of the elements to build in added value to the elements, and increase the profit of the manufacturer, since a higher price may be charged for the elements with "on board technology", because subsequent treatment may be reduced.

It will be readily appreciated that "on board technology" may be used together with the fixing and release systems of the invention, or independently.

The invention will now be described in reference certain drawings thereof, in which:

Figures 1 and 2 show the fixing of a first element to a second element using a locking pin;

Figure 3 shows in exploded form a connecting means, while Figure 4 shows the connecting means of Figure 3 in situ between first and second elements;

Figure 5 shows a connecting means which is capable of adjustment in vertical and horizontal directions, while Figure 6 shows the connecting means of Figure 5 set up to fix a wall panel to a stud;

Figure 7 illustrates the fixing of panels to a stud by induction or RF heating;

Figure 8 shows a stud which can be moved vertically to accommodate height variations;

Figure 9 is a section of the stud of Figure 8 taken along the lines A-A in Figure 8;

Figure 10 shows the remote fixing of a clip, to which a panel is to be affixed, with a stud. This figure also illustrates the "on board technology" concept in relation to the panel;

Figure 11 illustrates one method of manufacturing nodules on the face of a panel, by way of "on board technology";

Figure 12 shows part of the panel of Figure 11 with the nodules formed;

Figure 13 is a section of the board of Figure 12 taken along the lines A-A at Figure 12;

Figure 14 shows another embodiment of "on board technology", in two versions, the first where there are recessed pits on the face of the panel and the second where there are recessed pits on the edge of the panel;

Figure 15 shows two further versions of "on board technology", the first where there are nodules standing proud of the face of the panel and the second where the nodules stand proud of the edge of the panel;

Figure 16 shows two versions of further "on board technology", the first where there are ribs standing proud of the face of a panel and the second where there is a rib standing proud of the edge of the panel;

Figure 17 shows two further versions of "on board technology" in relation to a panel, the first being recessed channels in the face of the panel and the second being a recessed channel along an edge of the panel;

Figure 18 shows a pressing detail being a step in the manufacture of a rib shown in Figure 19;

Figure 20 illustrates in plan view the ribs of Figure 19 along a face of the panel, while Figure 21 is a section of the panel and ribs of Figure 20, taken along the lines A-A of Figure 20;

Referring first to Figure 1, locking pin 1 is injection moulded from a suitable plastic material and includes a metal strip 2. Locking pin 1 lies in recess 3 between element 4 and element 5. Recess 3 has a narrow end 6 which lies within element 5.

When a magnetic force is applied to locking pin 1, it is caused to move within recess 3 as shown in Figure 2, so that leg 8 of locking pin 1 is pushed into narrow recess 6, in turn expanding wall 9 so that it locks into the recess 10 provided in element 5.

Locking pin 1 may be reversed, so that elements 4 and 5 may be released, by the use of magnetic force. Magnetic attraction may be applied for fixing elements 4 and 5 and magnetic repulsion for releasing them, or vice versa. Alternately, the same magnetic force may be applied on opposite sides - for example, on the side near element 4 for fixing and on the side near element 5 for releasing.

Turning now to Figure 3, the connector illustrated includes a wall plug 11 which can be screw threaded into element 5 (refer Figure 4) and a cooperating member 12 which includes aerial 13, capacitor 14, switch 15 and encryption logic chip 16. Element 12 is able to act as a receiver/transmitter and is inserted in element 4.

To fix element 4 to element 5, plug 11 inserted in element 5 is aligned with member 12 inserted in element 4. A message is sent, for example, via radio waves, to aerial 13 in member 12 to activate switch 15 which in turn causes plug 17 to travel into cavity 18 provided in wall plug 11. Element 4 is thus fixed to element 5.

Encryption logic chip 16 may be capable of providing a report as to whether the connection between element 4 and element 5 has been stressed, such as by an earthquake or tremor.

Alternately or in addition, the movement of plug 17 into cavity 18 may transmit a signal to other fixing means which may then be caused to activate. As indicated above, this can be useful in providing a predetermined sequence of fixing, so that a large panel may be fixed at the four corners first, followed by automatic activation of the other fixing points.

With reference now to Figures 5 and 6, Figure 5 shows a connector 19 adapted to be fitted to one element (wall panel 20) and to be fixed to a second element, stud 21. Connector 19 has three sets of ribs, 22, 23 and 24. Ribs 22 permit adjustment of connector 19 (and panel 20) to the left and right as shown by arrow 25. Ribs 23 provide for adjustment in the in/out direction as shown by arrow 26. Ribs 23 can lock into extruded locking ribs 27 on stud 21. Ribs 24 provide for up/down adjustment in the direction shown by arrow 28 and can mesh with knurled locking ribs 29 on stud 21. Thus, panel 20 can be adjusted in the desired position before activating means (not shown) fix connector 19 to stud 21.

In Figure 7, dogbone stud 30, made of metal, and forming the first element, is shown together with the second elements, panels 4 and 4a. Beads of glue 31 are inserted in channels provided in dogbone stud 30. Glue 31 is a hot melt glue which is cured by RF heating. Until such cure takes place, dogbone stud 30 and panels 4 and 4a are maintained in place by a magnetic force, as indicated at 32.

Heat sufficient to melt glue 31 is applied by apparatus 33 which includes a rotating heated wheel which rotates in the direction indicated by arrows 34. Once glue 31 has been cured, the magnetic attraction holding dogbone stud 30 to panels 4 and 4a can be released.

In Figure 8, foam stud 35 is provided in a length shorter than the vertical height of the wall panel 36 to be mounted. For example, foam stud 35 may be 2 metres long whereas wall panel 36 may be 2.3 metres high. A suitable locking means, activatable remotely, is indicated at 37. Lock 37 could be activated by magnetic means, for example. Stud 35 includes a number of adjustment ribs 38, the profile of which can be seen in the section in Figure 9.

In Figure 10, panel 4 includes edge groove 39, which is an example of "on board technology". Into groove 39 is fitted extrusion 40 on connecting clip 41, which comprises one element to be fixed to a second element, stud 21. Clip 41 has extruded arms 42 which snap fit into channel 43 of stud 21. Means 44 in clip 41 may be activated after arms 42 have snapped into channel 43, so as to retain

arms 42 in channel 43 until such time as release is required. Activation may be by magnetic or other suitable means.

Figure 11 shows an embodiment of manufacture of a panel with "on board technology", being a series of spaced nodules. This invention also includes within its scope a method of manufacture of such a panel. In the example shown, applicator 45 deposits small quantities of appropriate material 46 on a face of panel 5, as board 5 travels in the direction of arrow 47.

Board 5 is then inverted as shown by arrows 48 so that material 46, owing to its qualities, develops into nodules 49, under the influence of gravity. These nodules may set without any further treatment, or may require curing, such as by heat.

Figures 14 and 15 show how "on board technology" may be incorporated into panel 5, either on a face or an edge thereof, in the form of recessed pits 50 (Figure 19) or proud nodules 51 (Figure 15).

Similarly, Figures 16 and 17 show how panel 5 can incorporate "on board technology", in the form of proud ribs 52 (Figure 16) or recessed channels 53 (Figure 17).

The manufacture of ribs 52 on panel 5 is detailed in Figures 18 and 19, with a plan view shown in Figure 20 and a sectional view shown in Figure 21. First, ribs 52 are formed as shown in Figure 18, with the locking portion 52a formed as shown in Figure 19.

As will be readily appreciated by those skilled in the various arts, the inventions disclosed herein are not limited to the examples set out and have wide applications in many areas. These inventions represent significant advances in the relevant arts.

Dated this 18th day of March, 1998

Dickory Rudduck

By his Patent Attorneys

Chrysiliou Moore Martin

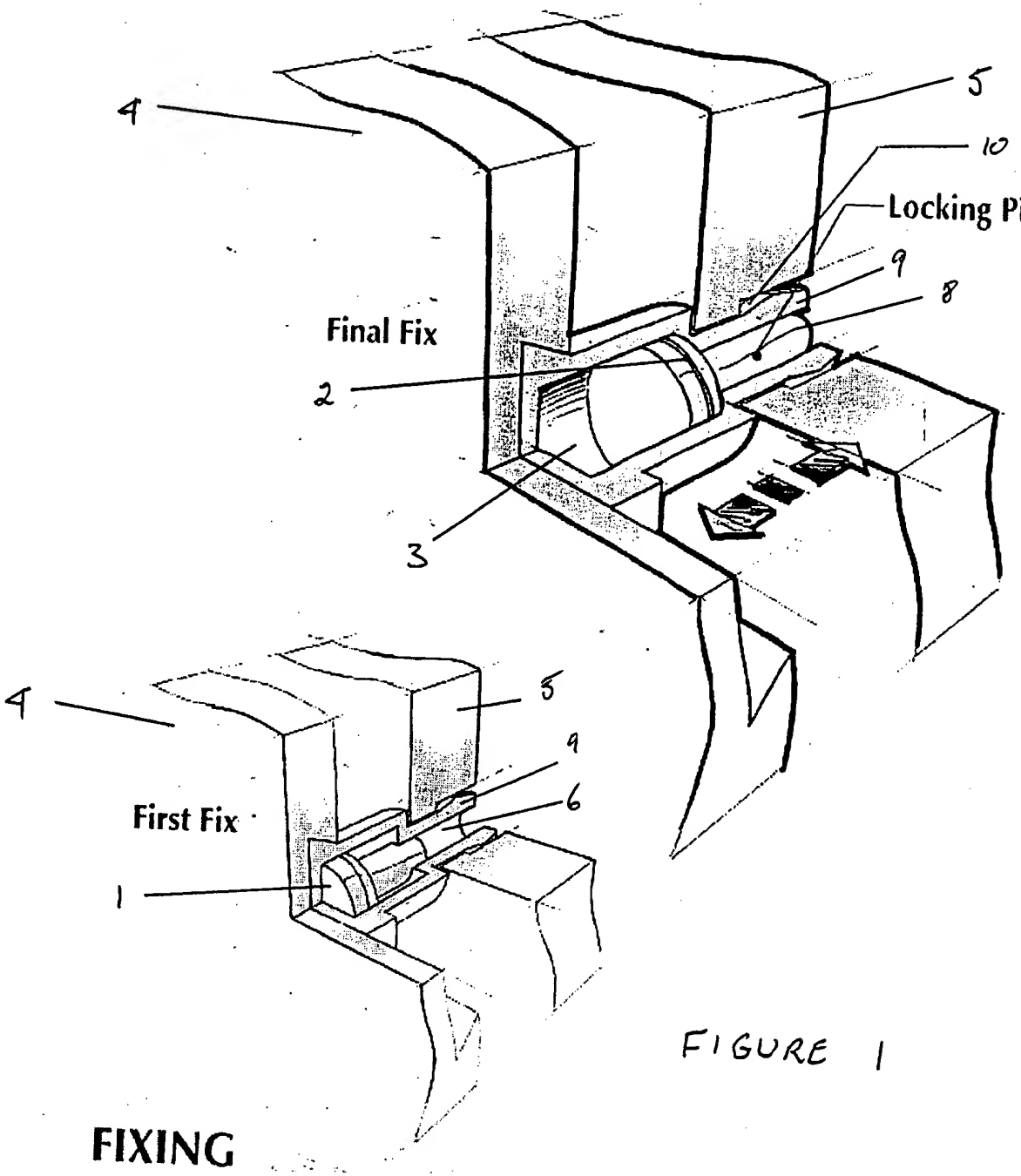


FIGURE 2

FIGURE 1

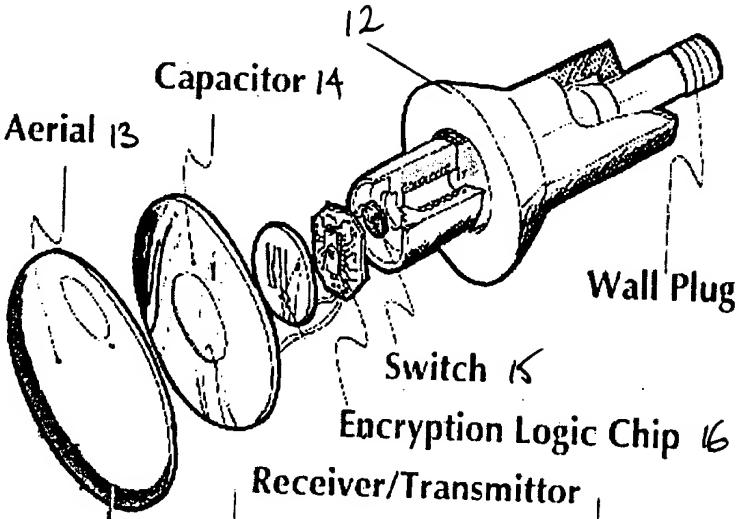


FIGURE 3

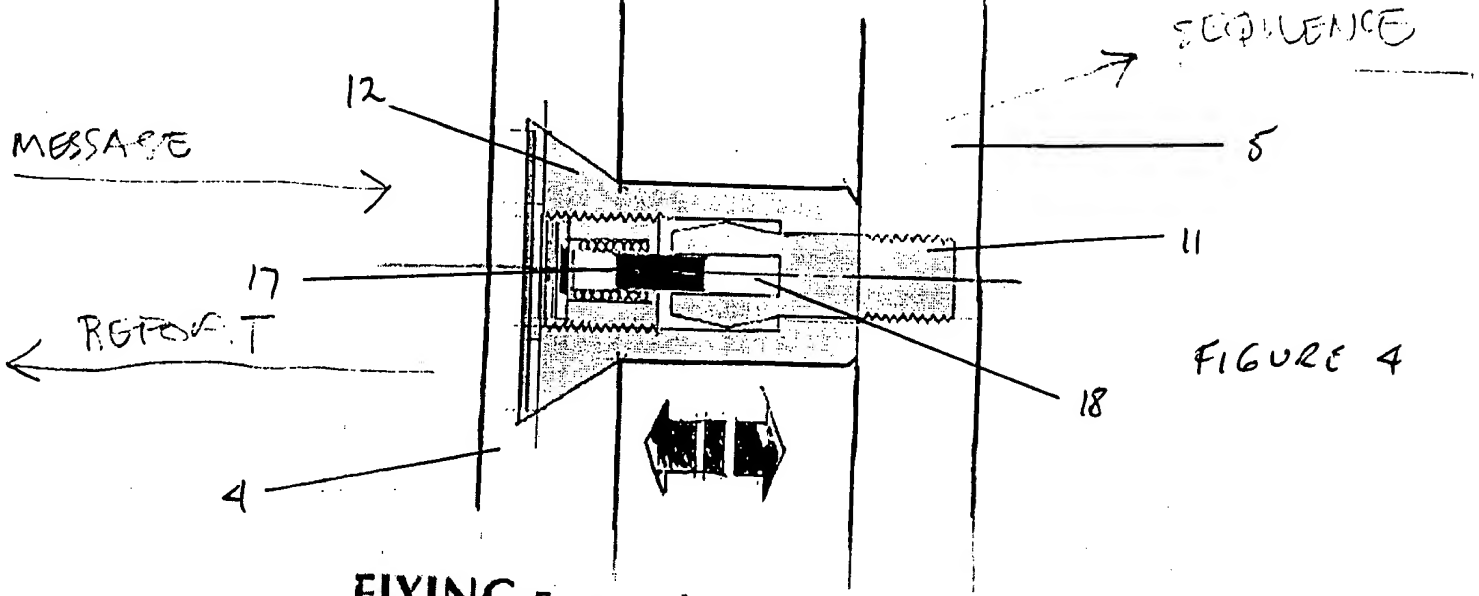


FIGURE 4

FIXING Encrypted/Sequenced T.Z Fastener

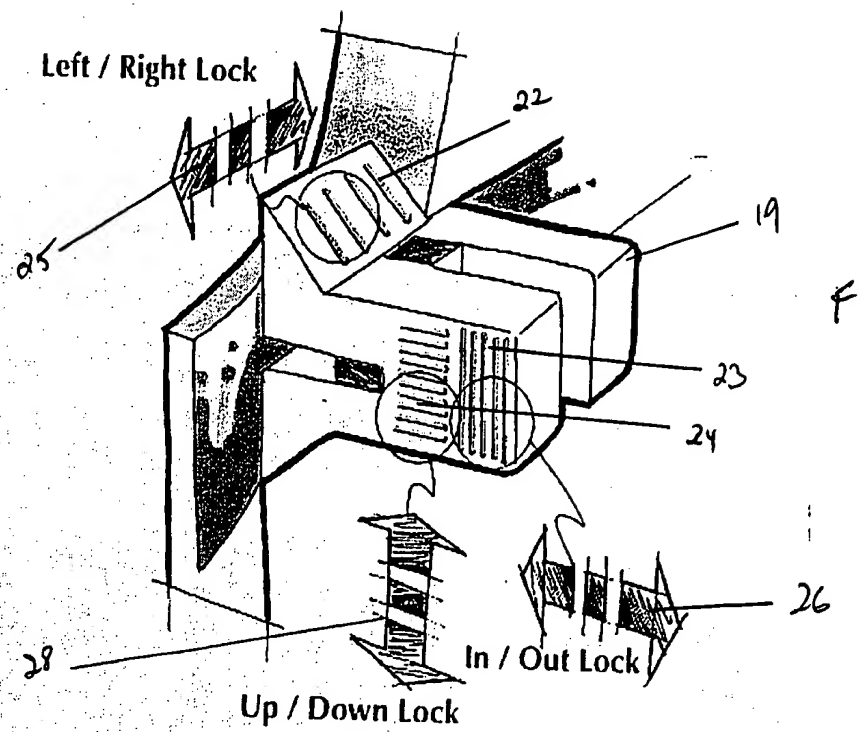


FIGURE 5

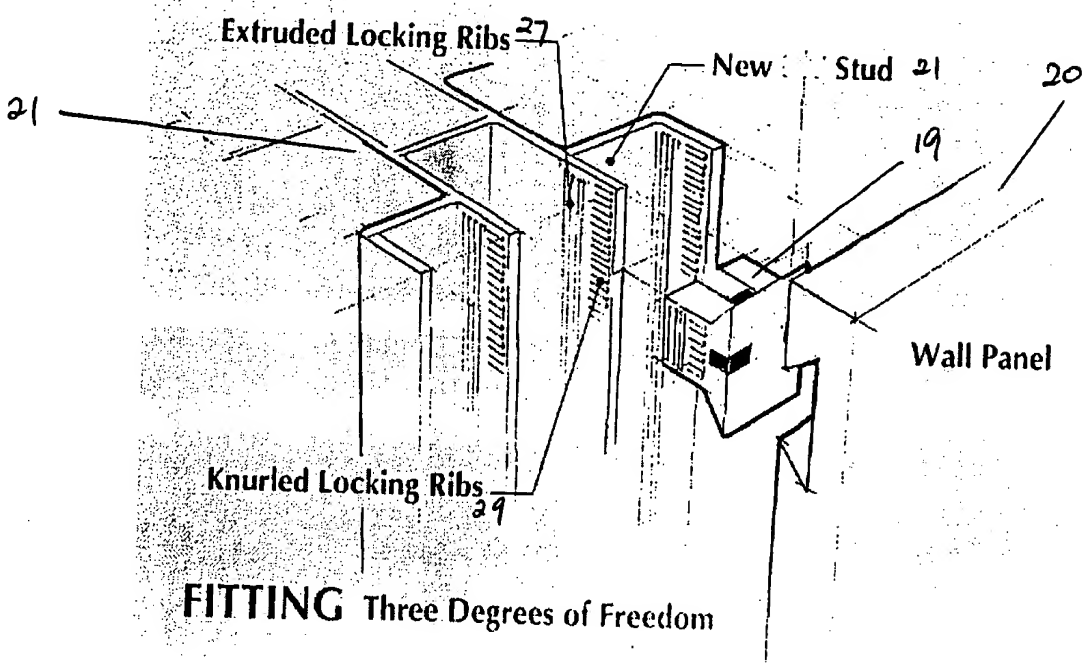


FIGURE 6

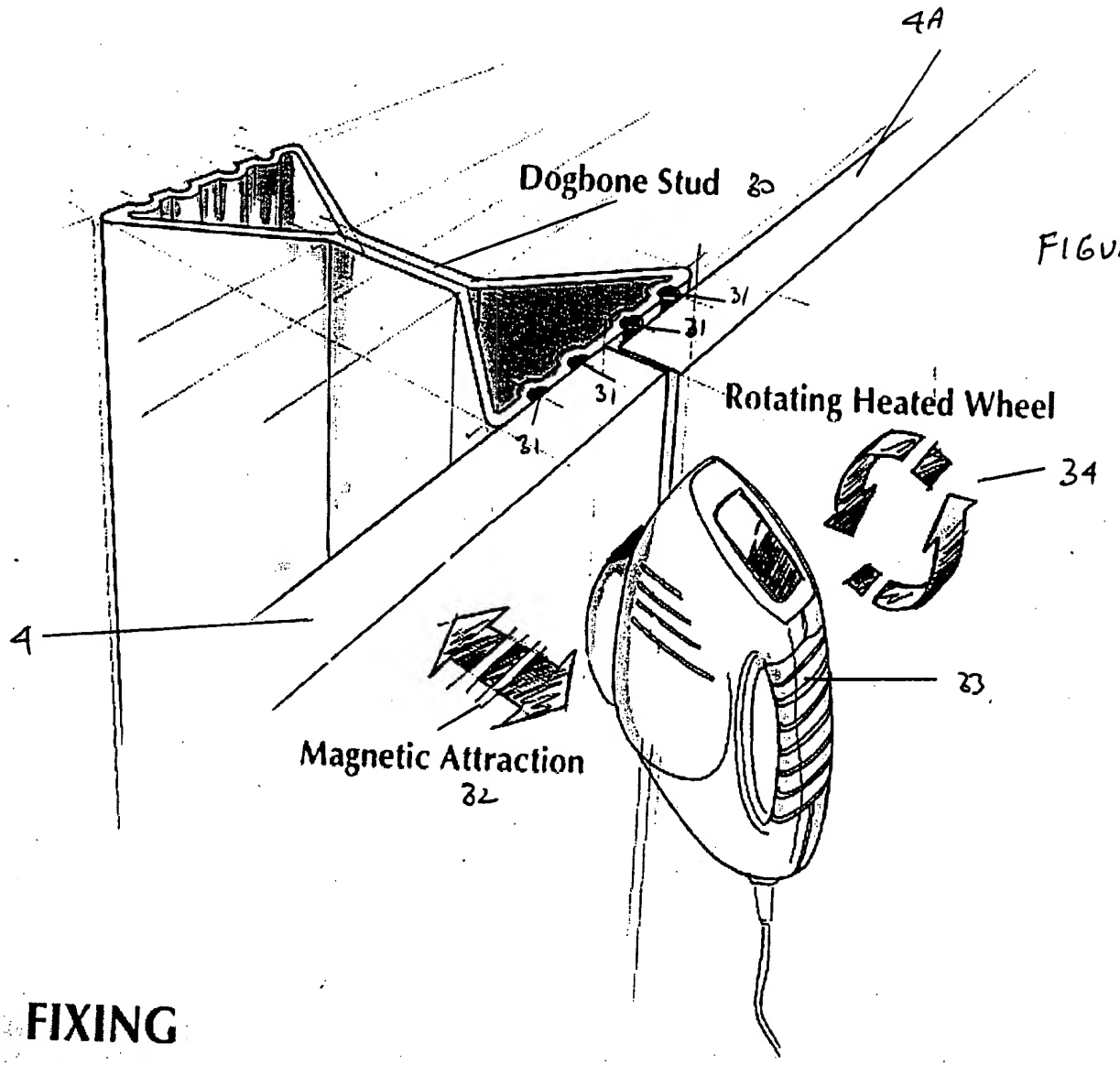


FIGURE 7

FIXING

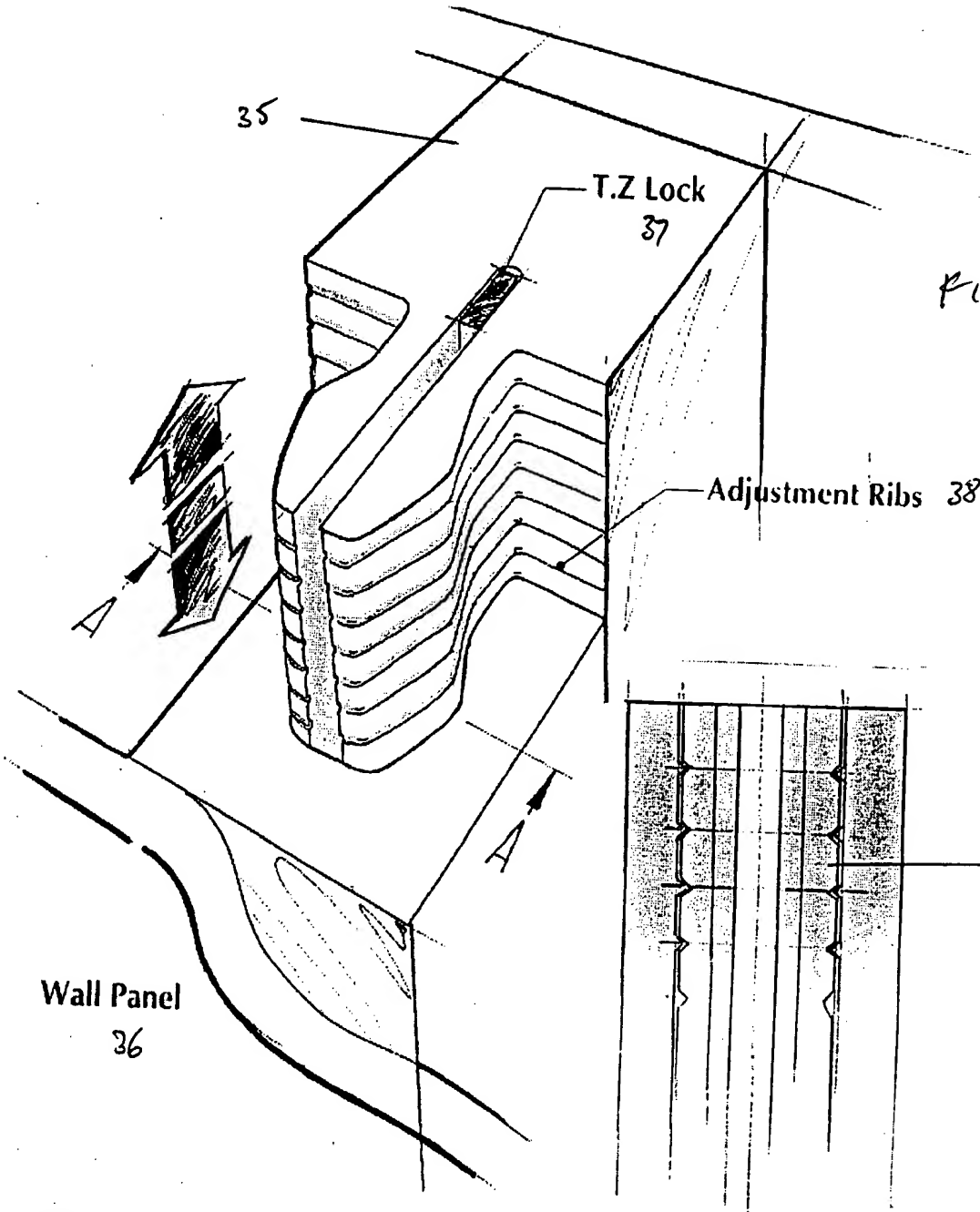


FIGURE 8

FIGURE 9

SECTION A - A

FITTING XStud with TELE ZYGOLOGY

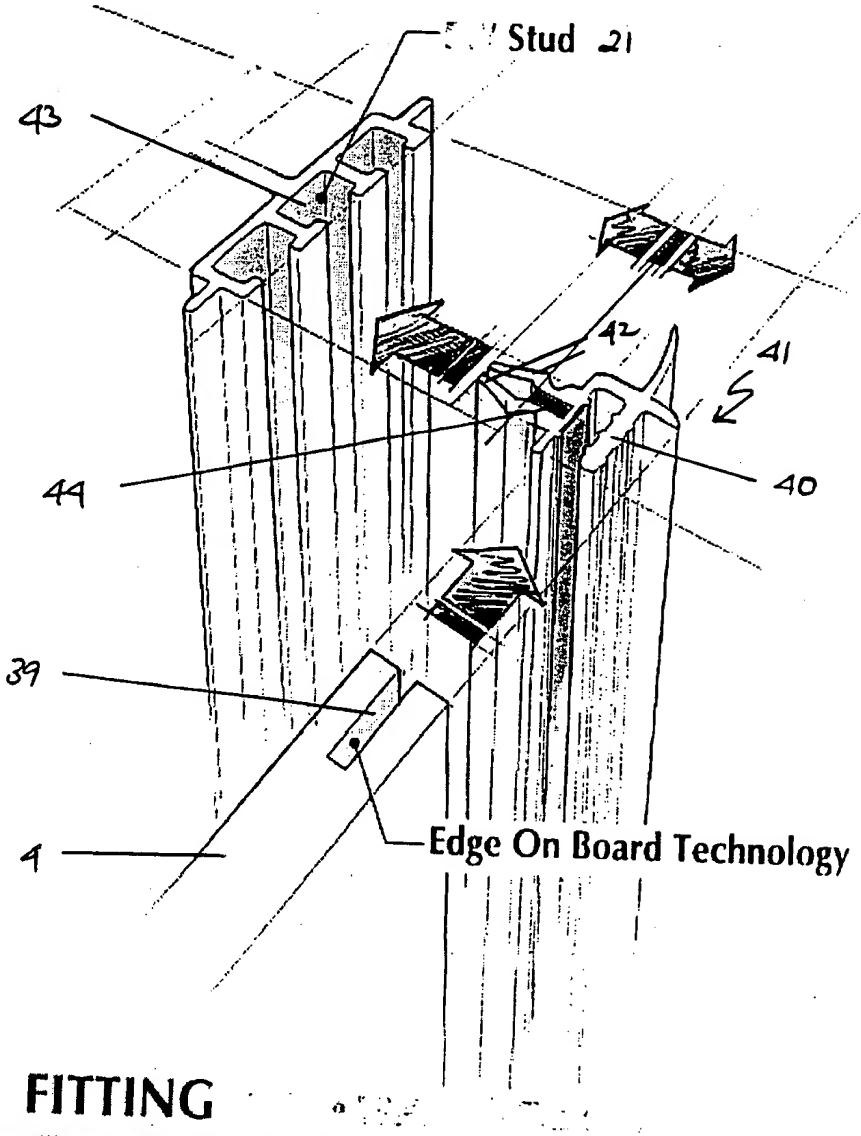


FIGURE 10

FITTING

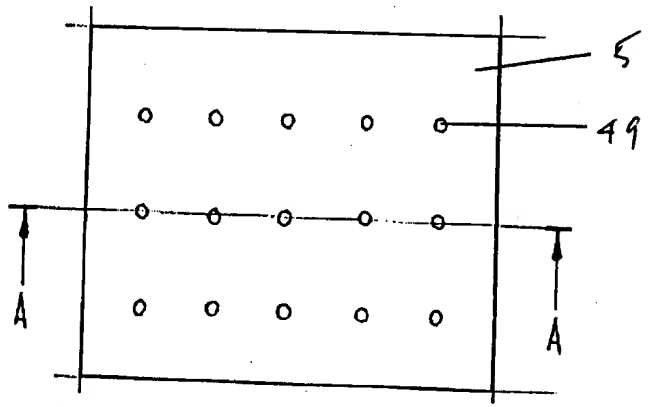
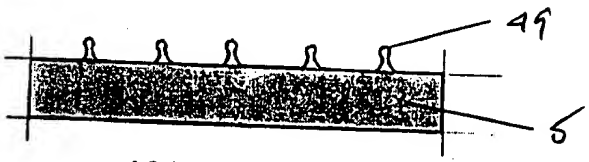


FIGURE 12



SECTION A-A

FIGURE 13

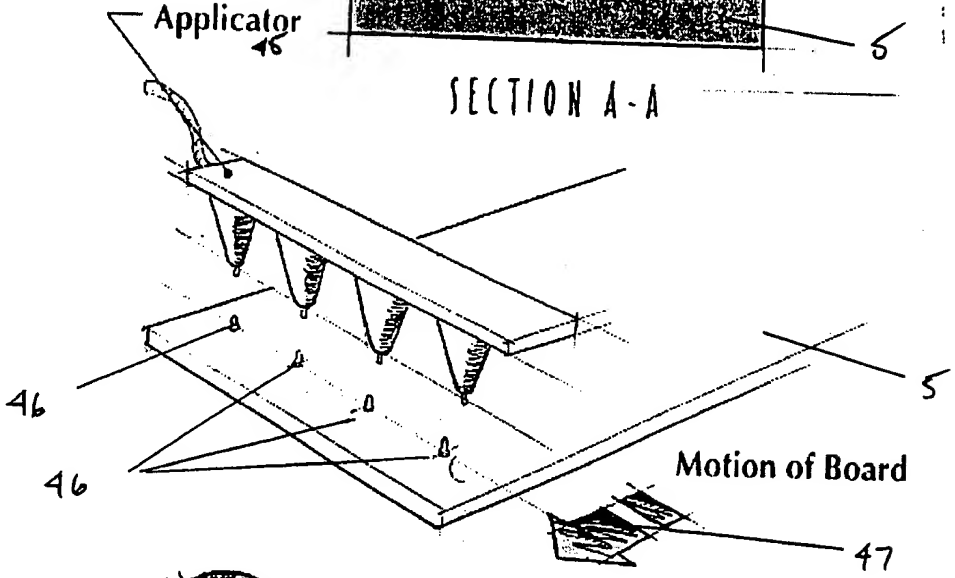
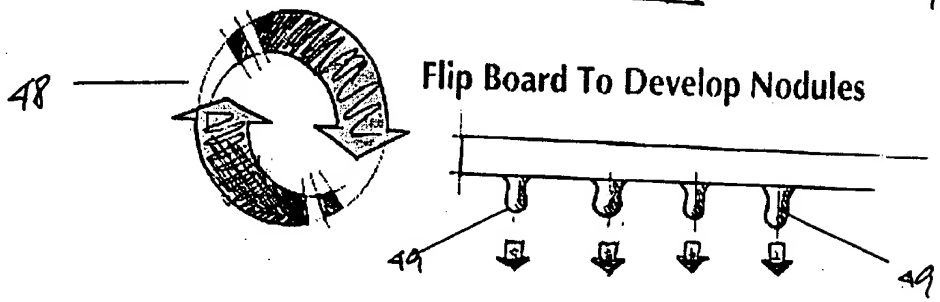
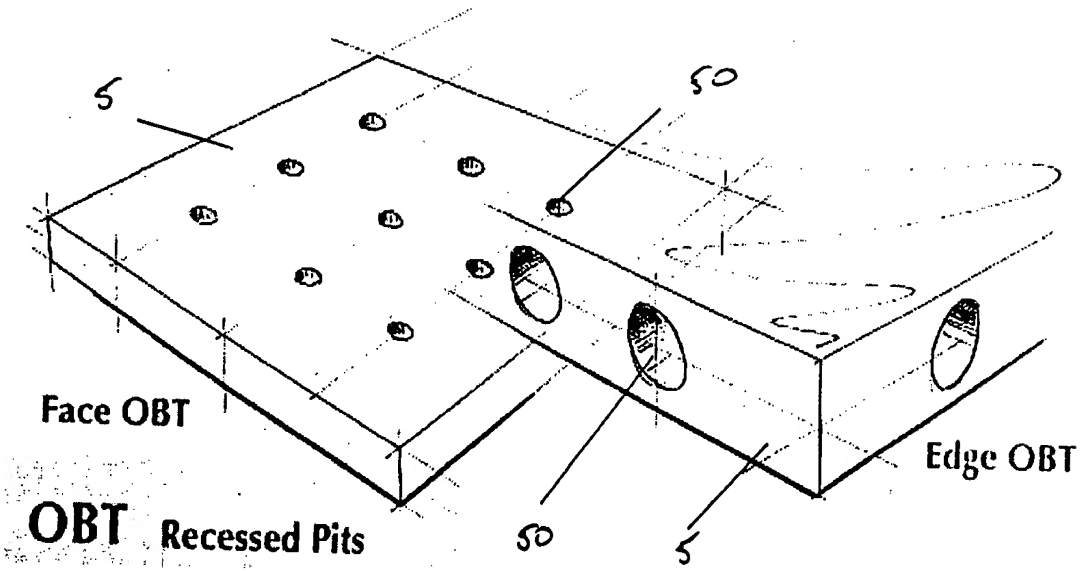


FIGURE 11



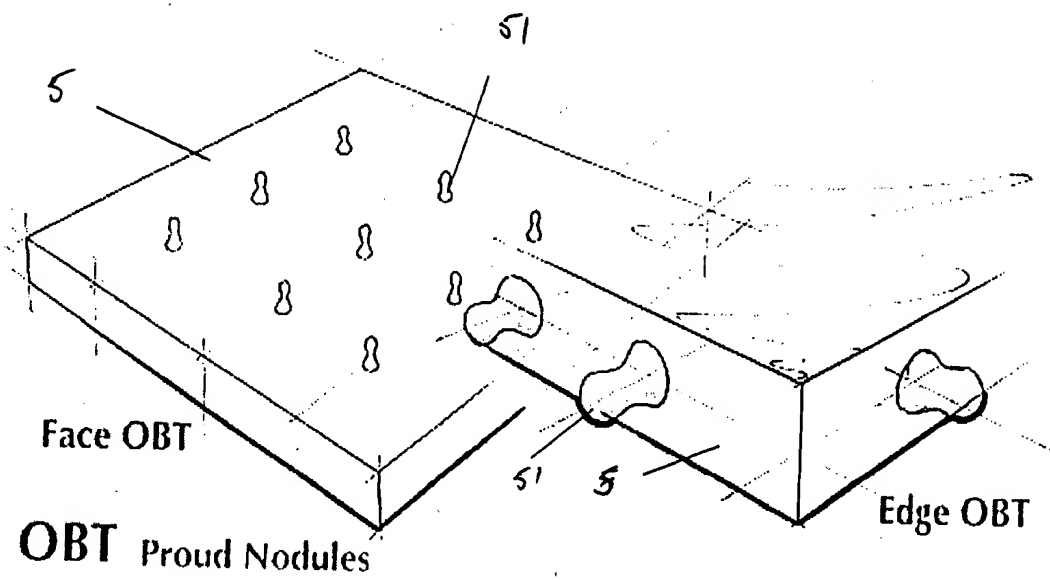
ON BOARD TECHNOLOGY



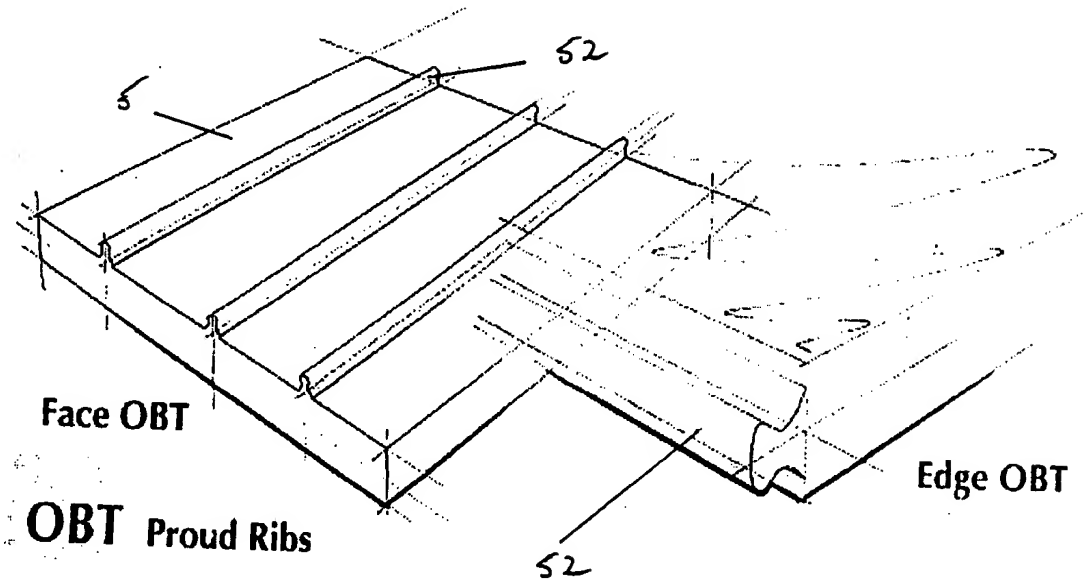
OBT Recessed Pits

FIGURE 14

FIGURE 15

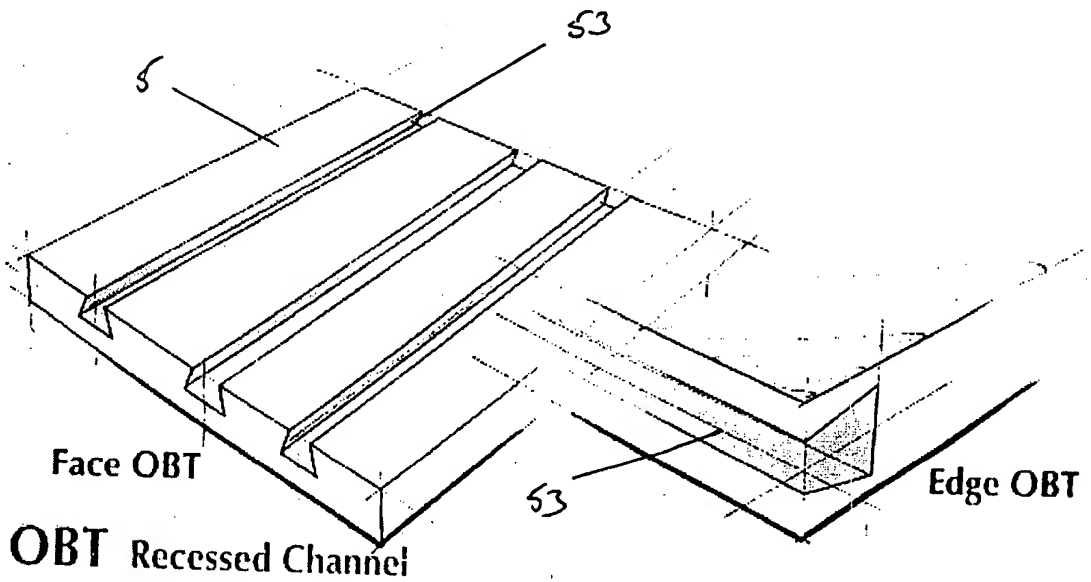


OBT Proud Nodules



OBT Proud Ribs

FIGURE 16



OBT Recessed Channel

FIGURE 17

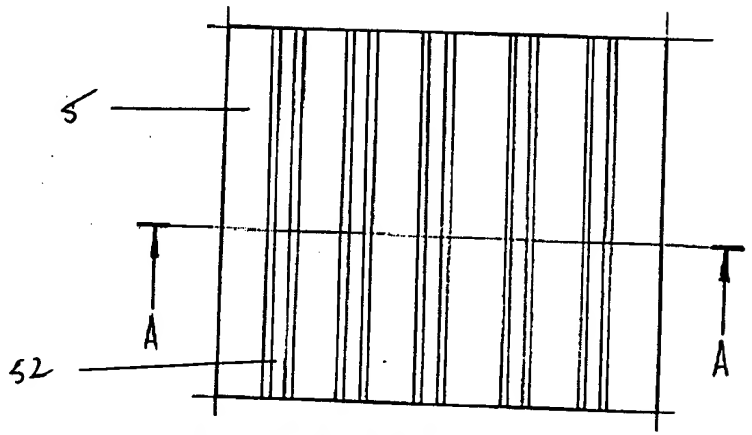
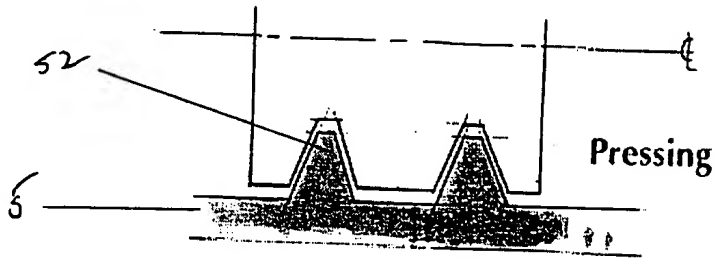


FIGURE 20

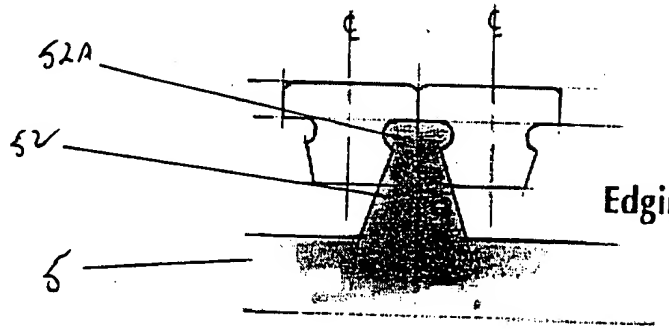
SECTION A-A

FIGURE 21



Pressing Detail

FIGURE 18



Edging Detail

FIGURE 19

ON BOARD TECHNOLOGY